RIBBONMICS & PREAMPS | since 1964
www.ribbonmics.com | tel: +1-626-798-9128 | fax: +1-626-798-2378

AEA RPQ500

VERSATILE MIC PREAMP IN THE 500 SERIES FORMAT

{ OWNER'S MANUAL }

Revision 2, July 2023

{ WELCOME }

Congratulations on your purchase of the AEA RPQ500 preamp and welcome to the AEA family. Here at AEA, we put the same thought and care into the RPQ500 as we put into the development of our microphones – the sound of the music comes first. Building on the obstacles identified when designing preamps in the 50's, we now use tools like quiet JFETS and transformerless designs to construct clean, high gain, high impedance preamps. The RPQ500 leans on the side of neutral but is unlike other clean preamps because of its rich and musical tonality. Designed after the successful RPQ preamp, the RPQ500 module provides the same signal path that has earned AEA preamps their great reputation, but in a 500 series package.

Your RPQ500 is 100% handcrafted in Pasadena, CA. AEA is a family owned company with a small crew of skilled technicians – most of them being musicians themselves. Proudly independent, we still manufacture all our ribbon microphones and preamps by hand from locally sourced parts.

We hope that the RPQ500 will help you capture many magical performances that touch the heart. Please read this manual thoroughly to make sure that you get the best sound and longevity from your new preamp. We invite you to become part of the AEA community by sharing your experiences with the RPQ500 via e-mail, phone or our social media channels.

Wes Dooley

Founder of AEA

TABLE OF CONTENTS

INTRODUCTION

Based on the circuit and topology of the RPQ, the RPQ500 provides an ultra-clean, high-gain signal path that has earned AEA preamps their great reputation. Specifically designed for ribbon microphones, the RPQ500 excels at drawing out the warmth and lush sound ribbons are uniquely known for. The RPQ500 boasts 81dB of gain, minimal path for pure tone, low energy storage, CurveShaper™ EQ section, and a mic/line switch, useful for bypassing the Mic Gain section when you want to use the module in line mode for post-EQ processing. The high input impedance of 10K Ohms yields a better performance from your passive ribbons including a higher bandwidth, higher output sensitivity, and better overall transient response. A passive ribbon mic is only good as the preamp you match it with. Whether you are using an AEA ribbon or any other passive ribbon mic, we understand how much you can enhance the sound of your ribbons with the right preamp. In fact, by virtue of its sonic qualities and versatility, the RPQ500 is the tool of choice for all microphones – condensers, moving-coil, and ribbons alike – whenever a true and pristine signal path is desired.

GENERAL GUIDELINES

To maintain the best performance from your new AEA RPQ500 preamp, take note of these three requirements:

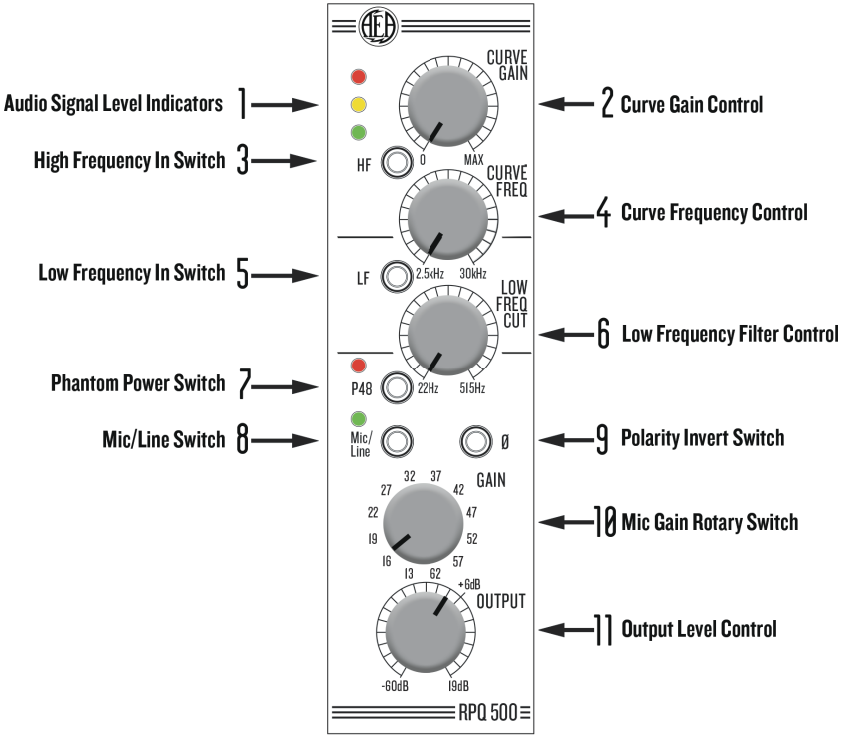
1) Before powering unit, make sure the preamp is properly secured and seated in the slot. Two flathead Phillips screws are supplied with each preamp.

2) Never place rack or preamp in close proximity to electro-magnetic fields or hot surfaces. Electromagnetic fields created by power transformers, motors, or RF transmitters can potentially damage or interfere with the preamp functionality. Make sure to keep your preamp and 500 rack away from these sources in addition to hot surfaces.

3) Before turning on the power, all connections to the preamp should be made and the Mic Gain and Output Level control set at their minimum setting. Be sure to examine your signal chain before powering up the preamp to ensure sudden loud noises are not emitted which could damage your system or hearing.

The AEA RPQ500 preamp is a API VPR approved 500 module. Certification in this program guarantees our 500 series product fulfills API's rack design specifications, including physical and electrical consistency guidelines and standardization. It is strongly recommended that you use a rack that is well-qualified for current API 500 module standards.

FRONT PANEL GUIDE



1- *Audio Signal Level indicators*:
The green LED snaps on at -20 dBu to indicate the presence of signal; the yellow LED snaps on at 0 dBu; the red LED snaps on at +24 dBu to warn of approaching signal overload.

2 - *Curve Gain control*:
This continuously variable control adjusts the HF gain from flat (+0dB) to maximum (approx. +20dB); the slope of the Curve-Shaper™ EQ varies as Curve Frequency and Curve Gain settings interact.

3 - *High Frequency (HF) In switch*:
OUT is true bypass; IN inserts the CurveShaper™ circuitry.

4 - *Curve Frequency control*:
This continuously variable control adjusts the +3dB break-frequency from 2.5 kHz to 30 kHz.

5 - *Low Frequency (LF) In switch*:
OUT is bypass; IN inserts the -20dB low-cut shelving filter.

6 - *Low Frequency Filter control*:
This continuously variable control adjusts the -3dB break-frequency of the filter from 22 Hz to 515 Hz; maximum LF reduction is -20dB.

7 - *Phantom Power (P48) switch*:
OUT is off; IN applies full-spec P48 phantom power to the input. The red LED near the switch will indicate when P48 phantom power is engaged.

8 - *Mic/Line switch*:
OUT is Mic Input mode; IN is Line Input mode which bypasses the mic preamp stage to accomodate line-level signals. The green LED near the switch will indicate when the Line Input mode is engaged.

9 - *Polarity Invert switch*:
OUT is normal; IN is inverted.

10 - *Mic Gain rotary switch*:
This twelve-position switch selects from +13dB to +62dB of preamplifier gain.

11- *Output Level control*:
This continuously variable control provides up to +19dB additional output gain in Mic Input Mode, following the optional CurveShaper™ circuitry. It acts as a fader and allows -60dB attenuation of the output signal in the full counter clockwise position. One indicator tick below the +6dB is the 0db unity position.

INPUT & OUTPUT CONNECTIONS

Input Connections

The RPQ500 can be operated either as a mic preamp with the optional CurveShaper™ EQ, or as a stand-alone EQ and fader for line level signals. The default mode is the Microphone Input mode with the Mic/Line switch (ref. #8) in the OUT position.

With ribbon, moving-coil dynamic, tube, and any other microphones that do not use phantom power, it is recommended that the P48 switch (ref. #7) is set to the OUT position before and while they are connected, to prevent possible damage to the microphones. The LED below the phantom power switch will be lit in red when P48 is engaged.

To prevent damaging the equipment in your system, it is a good idea to test your microphone cables regularly to determine whether they have any open, shorted, reversed, or intermittent connections.

Line Input Mode

Line Input mode bypasses the mic preamp stage to accommodate line-level signals.

Depressing the Mic/Line switch (ref. #8) bypasses the first gain stage and routes the signal from the XLR input connector straight to the optional CurveShaper™ circuitry and the Output Level control (ref. #11). The LED near the Mic/Line switch will indicate when Line Input mode is engaged.

Phantom power cannot and should not be applied to line-level devices. In Line Input mode, the inputs of the RPQ500 will always be free from phantom power, even if it is accidentally engaged. Nevertheless, it is recommended to keep the phantom power off when the unit is used in this mode.

Output Connections

The output of the RPQ500 emulates a transformer-coupled output and can be used as either a balanced or unbalanced signal (depending on how your cable/system is configured). When balanced, the maximum output level is +28 dBu; when unbalanced, the maximum level is +22

dBu. (These are as measured into a 600 Ohm load; the recommended load is > 10K Ohms; 0 dBu = 0.7746 V rms.)

When unbalancing the XLR output, pin-3 must be tied to ground at the receiving end (i.e. the input of the following device). Do not tie pin-3 to ground directly at the output of the RPQ500.

As a reminder, test your cables regularly to be sure that they are in proper working order.

Input Impedance

The average preamp has an input impedance sitting around 1200 Ohms. Passive ribbon microphones and numerous moving-coil dynamic microphones are very particular about how they interact with preamps and their respective impedances play an important part in this. Since passive ribbon microphones and some dynamic microphones generally have a very high impedance, they are sensitive to what is referred to as "loading." The lower the impedance a mic must drive, the harder the mic has to work. If the input impedance of a preamp is too close to the impedance of the microphone, it may exhibit increased distortion, decreased headroom, poor transient response, and less overall frequency response. There are no negative consequences to using high input impedance preamps.

Unleash the full potential of your mics with the RPQ500's high impedance circuit. The RPQ500's NoLoad™ high-input impedance of 10K Ohms guarantees the highest sensitivity, bandwidth, transient response, and clarity from your microphones.

{ SETTING THE GAIN }

The RPQ500's JFET circuit design generates up to 81dB of clean and quiet gain, with extended bandwidth from below 1 Hz to beyond 200 kHz, for dynamic range and transient response that complements all microphones.

As with any piece of audio equipment, setting and maintaining proper signal levels are critical to obtaining optimum performance: if the level is too low, you sacrifice noise performance; if too high, you risk overload distortion. The AEA RPQ500 provides an easy method for setting and monitoring the system gain.

Microphone Input Mode

The Mic Gain control (ref. #10) provides +13dB to +62dB of gain for the preamplifier input stage. The Output Level control (ref. #11) adds another +19dB of output gain, following the optional CurveShaper™ circuitry, for a total of +81dB of gain.

Start with the Mic Gain control (ref. #10) fully counterclockwise and the Output Level control (ref. #11) pointing one tick below the +6dB indicator. This is the unity position on the Output Level control. Then, with the microphone in position, increase the Mic Gain control until you are happy with the input level in your DAW, console, or tape machine. On the RPQ500, if the red LED is illuminated too often or too long, reduce the Mic Gain control one step at a time until it illuminates only briefly at the loudest peaks. The red LED is only triggered when the input level is 4dB or less away from clipping the preamp's output. If the red LED occasionally flashes while recording, it does not necessarily mean that the preamp is clipping.

Note, however, that if you subsequently apply high-frequency (HF) boost, you may need to reduce the Mic Gain control correspondingly to avoid system overload.

Also remember, the energy and excitement generated during a performance guarantees that it will always be louder than the rehearsal, so after determining the gain during the sound-check it is a good idea to set the Mic Gain control one or two clicks lower for the performance to allow yet a little more margin for headroom.

Line Input Mode

When using the Line Input mode, the Mic Gain control (ref. #10) is bypassed. The Output Level control (ref. #11) allows you to control the overall level of the Line source. The Output Level control can apply up to +19dB of gain in the full clockwise position or can attenuate the signal as much as -60dB just like a fader on a console.

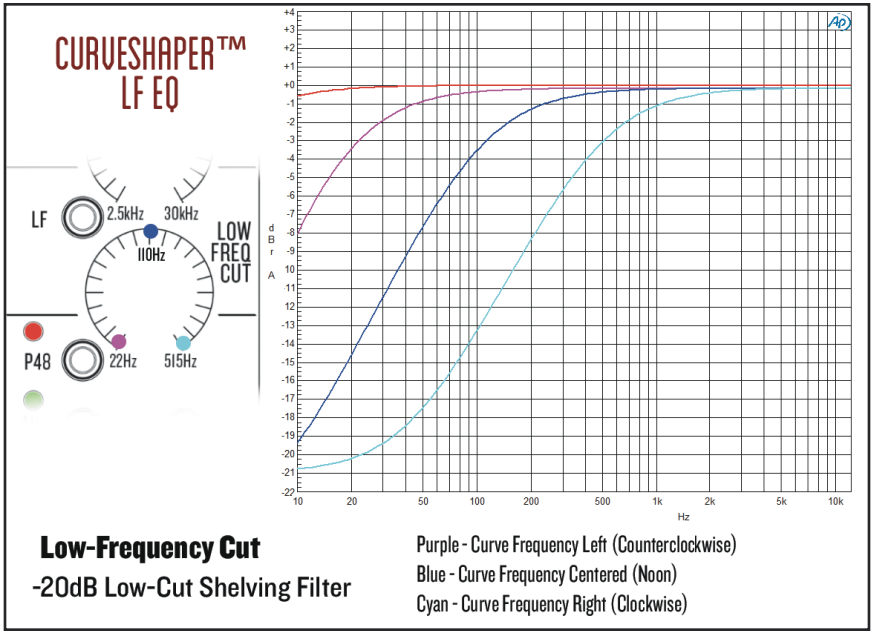
If you subsequently apply HF boost, you may need to reduce the Output Level control correspondingly to avoid system overload.

Again, the LED level indicators (ref. #1) monitor the signal level at a point in the signal path just prior to the input of the balanced output amplifier. The green LED comes on in the presence of low-level signal;

the red LED turns on when you are approaching signal overload or "clipping".

THE EQ SYSTEM

Using the LF Filter



AEA RPQ2 LF Filter Response

The RPQ500 was designed to complement ribbon microphones. AEA Big Ribbon™ mics deliver sub-woofer lows, which the RPQ500 renders faithfully. Such strong low-frequency content can mask high-frequency intelligibility, so the tunable low-frequency (LF) filter was engineered to reduce low-frequency energy to appropriate levels. Directional microphones when moved closer on-axis to a sound source become more sensitive to low frequencies. This proximity effect, otherwise known as "bass tip-up," becomes more pronounced the closer the distance. With some large transducer microphones, such as the AEA/RCA R44, proximity effect begins at six feet and is extremely pronounced at a distance of one inch.

LF filters can tame proximity effect and reduce other unwanted low-frequency noise, such as air-conditioning rumble, traffic noise, "P-pops" and breath-noise. However, a fixed-frequency, constant slope low-cut filter cannot handle all situations effectively. The RPQ500 offers a

flexible Low Frequency Filter control (ref. #6) that can be tailored to satisfy the varying and critical demands of both speech and music. Pushing in the LF Filter switch (ref. #5) inserts a -20dB (maximum) low-cut shelving filter. The Low Frequency Filter control adjusts the -3dB break-frequency of the filter.

Setting the filter is easy: push in the LF Filter switch and adjust the tuning control until you like the sound. Then toggle the LF Filter switch quickly to compare the result against the original.

Using the HF CurveShaper™ EQ

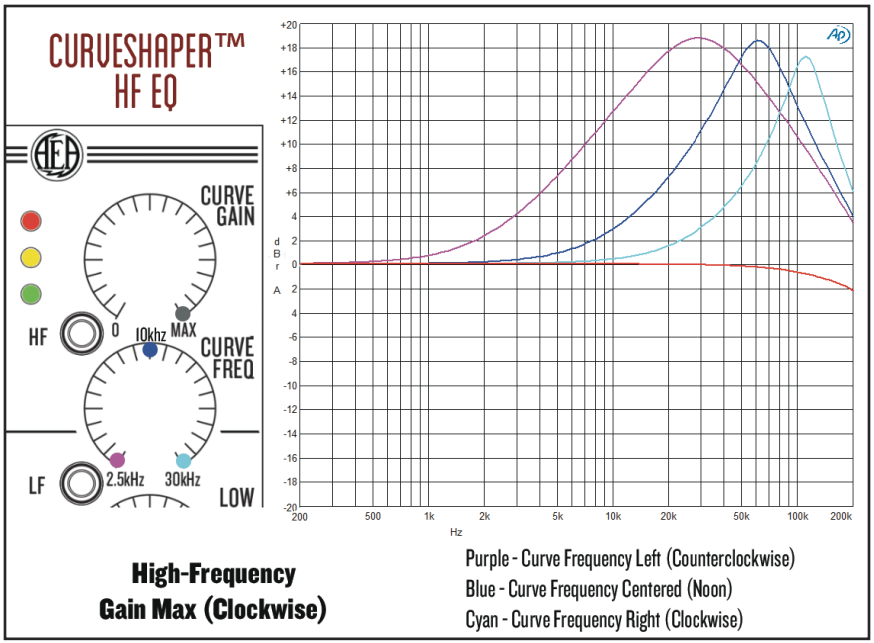
The RPQ500 features a unique CurveShaper™ circuit that enables you to add a little extra "presence" or "air" to compensate for high-frequency losses that are inherent to most ribbon microphones, the result of distant mic placement, or to restore presence in a "dry" acoustical environment.

The circuit functions similarly to a conventional parametric shelving boost but with a significant difference: the slope and bandwidth varies as both the Curve Frequency and Curve Gain controls are adjusted.

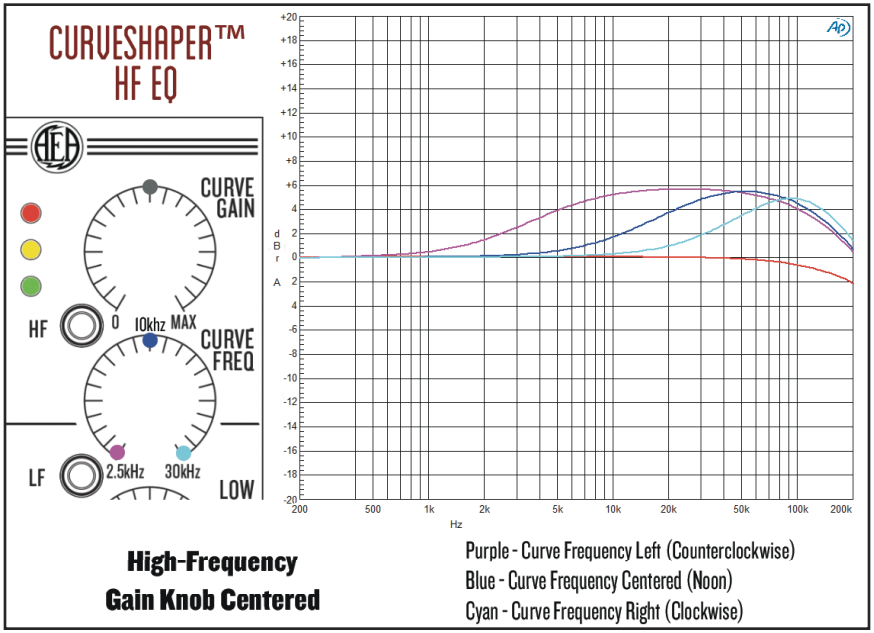
From a technical standpoint, it is evident the EQ shape of the CurveShaper™ is a bell. At its lowest setting, the peak frequency of the CurveShaper™ is 30 kHz while at its highest setting, the peak frequency is 120 kHz. In many instances, a bell with a peak at 120 kHz is not very practical since it is above the human frequency threshold of hearing. But the CurveShaper™ has a very wide bandwidth that allows the left side of the bell to essentially act as a high-frequency shelf.

The Curve Frequency knob, at its lowest setting, will yield a gentler slope and wider bandwidth. As the frequency is raised, the slope becomes steeper while the bandwidth narrows.

To activate the CurveShaper™ EQ section, depress the High Frequency IN switch (ref. #3). Start by adjusting the continuously variable Curve Frequency control (ref. #4). The frequency markings on the Curve Frequency dial indicate the +3dB break-frequency when the Curve Gain is at max. Select the desired frequency with the Curve Frequency knob, and then dial in the amount of boost you desire with the Curve Gain knob. The two controls are interactive. Use your ears to determine what frequency and gain setting sounds best.



AEA RPQ500 CurveShaper™ HF Response at Full-Boost



AEA RPQ500 CurveShaper™ HF Response at Half-Boost

In Line Input mode, the CurveShaper™ becomes a versatile EQ to add presence or air to any line level signal on a mix or even in mastering.

Be careful when you add Curve Gain because this also affects the overall gain structure of the preamplifier and could introduce overload distortion. After you make this adjustment, you may need to reduce the Mic Gain control (ref. #10) to compensate for the CurveShaper's™ signal boost.

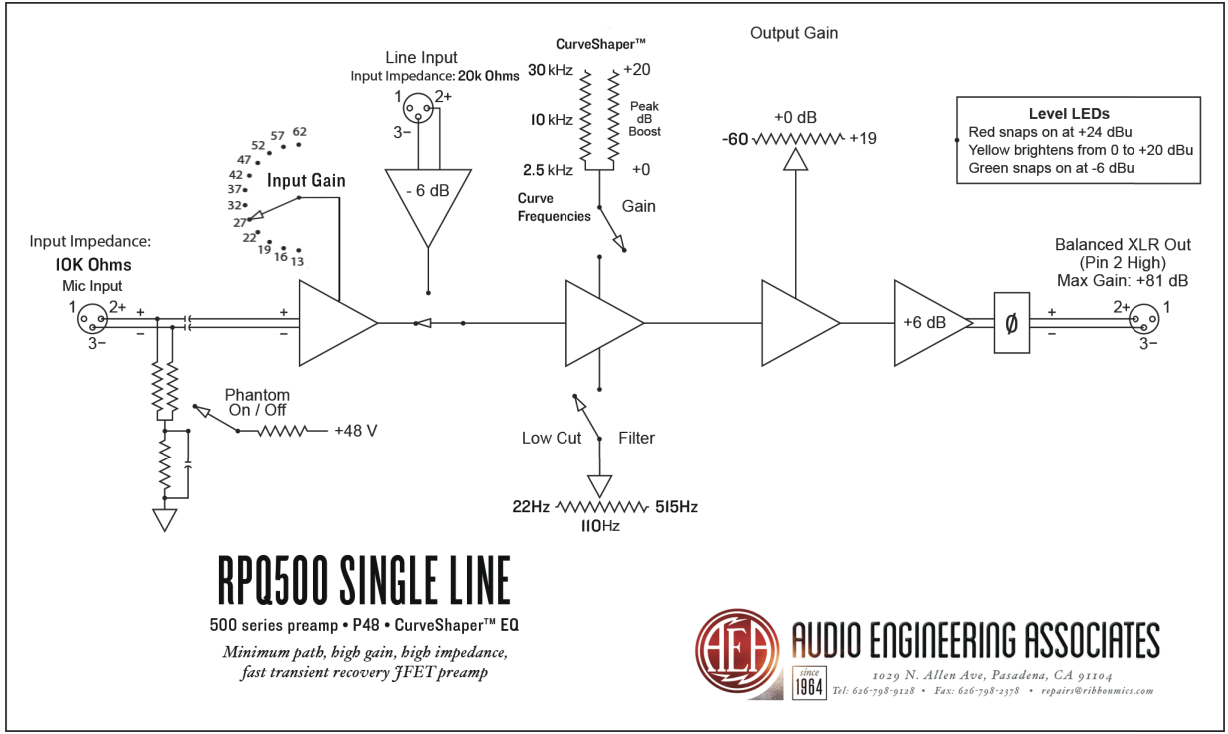
Note: When the Curve Gain is fully counter-clockwise (set in the "0" position), no EQ will be introduced into the signal. It essentially the same as having the HF In switch (ref #8) disengaged.

SPECIFICATIONS

Gain at 1kHz:	81dB of gain at 1kHz, balanced-in to balanced-out in Microphone Input Mode
Noise figure, rms A-weighted:	<2dB
Noise figure, rms unweighted:	<3dB, 20 kHz LPF bandwidth
EIN:	<-130 dBu A-weighted, 150 Ohm resistive source
DC Current Draw:	130 mA
Frequency Response:	-3dB <1Hz and >100 kHz
THD:	<0.02% at 1 kHz
Input Impedance:	10K Ohms
Line Input Impedance:	20K Ohms
Mic Gain Control:	Twelve-position switch provides from +13dB to +62dB of gain for the preamplifier circuit, as measured between the input and the before the output line driver.
Switched LF Shelving filter:	-3dB break-frequency tunable from 22 Hz to 515 Hz; maximum reduction -20dB.
Switched CurveShaper™ EQ:	+3dB break-frequency tunable from 2.5 kHz to 30 kHz; HF gain adjustable from +0dB to +20dB; the slope of the HF filter varies interactively and directly with the Curve-Shaper™ frequency and gain settings.
XLR output maximum level into 600Ω load:	+28 dBu, balanced; 0 dBu = 0.7746 V rms.
XLR connectors polarity:	Pin-1 is ground, pin-2 is high, pin-3 is low.
LED signal level indicators:	The green LED snaps on at -20 dBu to indicate the presence of signal; the yellow LED snaps on at 0 dBu; the red LED snaps on at +24 dBu to warn of approaching signal overload.
External Features:	Silk screened front panel markings. Grayhill series 71 stepped gain switch.
Dimensions:	0.125" anodized aluminum front panel with knobs and switches: 1.5" w, 7" d, 5.25" h (3.8 cm x 17.78 cm x 13.34 cm)
Weight:	0.75 lbs (~0.33 kg)

Download the RPQ500 recall sheet online at
www.ribbonmics.com/preamps/rpq500

THE RPQ500 IS AN API VPR-APPROVED MODULE



AEA RPQ500 Single Line Diagram (One channel)

WARRANTY

Your RPQ3 comes with a one-year limited warranty on parts and labor *. Registering your preamp within 90 days will extend the warranty to three (3) years. Scan the QR code or visit our website to register.

*AEA is not responsible for shipping costs

SUPPORT

If you should encounter any problems with your RPQ500 or have questions regarding specific applications, please contact our customer support team at support@ribbonmics.com for the quickest response.

To contact us by phone, please call 626-798-9128 from 9:00 a.m.- 5:00 p.m. PST Monday-Friday.

In compliance with the following requirements: RoHS2 Directive: 2011/65/EU

CE

Manufactured by AEA Ribbon Mics Inc.
1029 N. Allen Ave. Pasadena, California 91104, USA
Tel: +626-798-9127 Fax: +626-798-2378
www.ribbonmics.com